



University of Virginia Division of Nephrology Fellowship Handbook

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1 – General Description / Educational Purpose

The Postdoctoral Fellowship offered by the Division of Nephrology of the Department of Medicine provides an opportunity to pursue advanced training in clinical nephrology and to undertake training in basic science research or clinical research. The program is designed for trainees who wish to receive outstanding educational training in order to pursue a career in academic medicine (basic science, clinical research, or clinical education) or private practice.

The *mission* of the University of Virginia (UVA) School of Medicine Nephrology Fellowship program is to produce Nephrologists who are leaders in the field of Nephrology, whether in clinical or basic science endeavors. We also aim to produce physicians who possess habits of life-long learning in order to build upon their knowledge, skills and professionalism.

The clinical Nephrology program at UVA involves 2 years of training at the University of Virginia Hospital that integrates the 6 core competencies (patient care, medical knowledge, practice based learning and improvement, interpersonal and communication skills, professionalism and systems based learning). The trainee will participate in clinical training, research and scholarly activities. The training experience includes inpatient consultation services, management of end stage renal disease, renal pathology, transplantation nephrology, and outpatient nephrology clinical activities. The outpatient dialysis population consists of approximately 700 patients including both hemodialysis and peritoneal dialysis. Many of our hemodialysis patients will receive treatment in the UVA Kidney Center dialysis unit, as well as our six affiliated dialysis units. Our patients are referred primarily from (but not limited to) Virginia, West Virginia, Maryland, North Carolina and Tennessee. They represent a wide mix of racial and socioeconomic groups. The Division of Nephrology at UVA maintains satellite dialysis for the University in Fishersville, Zions Crossroads, Page, Augusta, Lynchburg and Orange, Virginia.

The 24-month curriculum consists of 9 months of inpatient consultation, 3-4 months of outpatient clinic and dialysis, 3 months of transplantation, 5-6 months of research, 2-3 months elective and 1 month of dialysis training. The fellows have two months of vacation. During the elective months fellows may receive additional training and experience in the areas of Pediatric Nephrology, renal histopathology, radiology, ultrasonography, urology, transplantation and interventional techniques. Electives at two community-based practices are also available: Lynchburg and Augusta, Virginia. The elective at Lynchburg is unique in that it offers an intensive experience in nocturnal home dialysis.

Following two years of clinical training, the trainee will have confidence in evaluating and managing patients with a wide variety of kidney disorders (including transplantation), and have had in-depth training in acute and chronic hemodialysis, continuous renal replacement therapy (CVVHD), renal biopsy, apheresis, dialysis catheter placement, ultrasound and renal biopsies. Each fellow performs approximately 30-40 renal biopsies during his/her training period. The trainee will also have: 1) developed skills to be an effective physician, 2) an appreciation of hypothesis driven-scientific investigation, 3) training in critically evaluating the medical literature and in scholarship.

2 – Typical Schedule

Clinical Nephrology Fellowship Training

Standard nephrology training for those interested in pursuing clinical nephrology in academic medicine or general practice. For those interested in research careers, a specialized program is designed.

First Year

5 months inpatient consult
2 months inpatient transplant
2 months research
2 months outpatient clinic/dialysis
1 month mandatory dialysis course

Second Year

4 months inpatient consult
1-2 months inpatient transplant
3-4 months research
1 month outpatient clinic/dialysis
1-2 months elective time
1 month (two 2-week blocks): AMC

Research Nephrology Fellowship Training

Two programs have been established, supported by an NIH T32 “Kidney Disease and Inflammation” and by the Center for Immunity, Inflammation and Regenerative Medicine:

Combined clinical/research training:

This program offers intensive training for those applicants (generally MD or MD, Ph.D) who seek a combined training in clinical nephrology and research

Research training only (M.D, M.D.,Ph.D. or Ph.D alone)

Available Electives: Urology, Pediatric Nephrology, Lynchburg Nephrology, Histopathology

3 – Conference Schedule

There are typically several conferences held throughout the week. The Conference Schedule can also be found online at <http://www.healthsystem.virginia.edu/internet/nephrology/fellowship/conferences.cfm>. (Kidney Center Conference Room: 5th Floor, Multistory West Complex, Room 5101)

Monday		
1200-1300	Renal Grand Rounds	Kidney Center Conference Room
Tuesday		
0800-0900	Medical Grand Rounds	Jordan Hall Auditorium
1200-1300	Journal Club	Kidney Center Conference Room
Wednesday		
1200-1300	Rotating Conference Series Hypertension Topics Transplantation Core Renal Physiology Core Topics in Nephrology Series	Kidney Center Conference Room
1400-1500 2 nd /4 th Wed	Research in Progress/ CIIR Seminar Series	TBD
1500-1600	CIIR Journal Club	TBD
Friday		
0800-0900	Transplantation Conference	Transplant Conference Room
1200-1230	Case Management Conference	Kidney Center Conference Room
1230-1330	Fellows Conference	Kidney Center Conference Room
1200-1300 4 th Fri	Biopsy Conference	Kidney Center Conference Room

Renal Grand Rounds

Combined adult and pediatric rounds are coordinated jointly by the Nephrology fellows and faculty. Interesting cases encountered in the hospital and clinics are presented and the evaluation and treatment plans are researched and discussed. The first Monday of each month is reserved for presentation of faculty-sponsored research project within the Division and from other institutions. Trainees are encouraged to use presentations as a springboard for publications.

Medical Grand Rounds

Faculty from UVa and other institutions are invited to discuss clinical topics in medicine. Several times each year, nephrology faculty are asked to present. Internationally recognized nephrology faculty are invited as visiting professors (see list under Visiting Professors).

Journal Club

The purpose of journal club is to develop the ability to critically analyze data reported in the literature. In general, papers are presented and discussed from high quality clinical journals (NEJM, Kidney International, J Am Soc Neph, Ann Int Med, Lancet, Transplantation) and basic science journals (Nature, J Biol Chem, Cell, Science, Proc Natl Acad Sci, J Clin Invest, Am J Physiol).

Rotating Conference Series

Conferences cover hypertension, renal physiology (and its clinical application), core topics in nephrology, and a core teaching series in renal pathology. The hypertension series is in conjunction with the endocrinology division and features discussion of difficult cases and review of current literature.

Renal Physiology and Transplant Core Lectures

The first and second Thursdays of each month are reserved for Renal Physiology and Transplant Core Lectures where basic physiology of the kidney is taught along with clinical applications. Transplant immunobiology and management issues are also discussed. The third Thursday is reserved for Nephrology Clinical Research where clinical trials and topics relevant to clinical research are discussed.

Research in Progress/CIIR Seminar Series

The newly created Center for Immunity, Inflammation and Regenerative Medicine (CIIR), in conjunction with the Division of Nephrology, conducts a Research in Progress (RIP) and seminar series. In RIP, laboratory research is presented informally by principal investigators (PIs), postdoctoral fellows, graduate students and technicians. Visiting scientists are invited to present their research in the seminar series.

Biopsy Conference

Conference is arranged by the faculty and attended jointly by adult and pediatric Nephrology, as well as pathology (Dr. Helen Cathro). Renal biopsies performed during the month are reviewed and discussed.

Transplantation Conference

Members attend this conference from multiple subspecialties including Gastroenterology, Cardiology, Surgery and Nephrology. Topics in transplantation are presented and discussed by faculty and fellows.

Case Management Conference

Ongoing, active cases are discussed.

Fellows Conference

Various topics are discussed including clinical Nephrology, theoretical and practical aspects of dialysis, electrolyte, fluid and acid-base disorders, and transplantation Nephrology. Over a period of two years, major topics on the Nephrology Subspecialty Board will have been covered.

Summer Core Curriculum

A core nephrology curriculum is provided at the beginning of each academic year. This 2-month curriculum is intended to provide fundamental practical concepts in various topics in nephrology early in the training program. This permits the accelerated acquisition of core information used in management of outpatients and inpatients. Topics may vary from year to year but include: evaluation of renal function, hemodialysis (including continuous hemodialysis), peritoneal dialysis, evaluation and management of patients with acute and chronic renal failure, evaluation and management of acid-base and electrolyte disorders, evaluation and management of renal transplant patients, and others.

Core Competency Curriculum

In addition, the Program Director provides information regarding educational materials pertaining to core competencies that may be sent by the Graduate Medical Education Committee or other sources. Fellows are required to complete HIPAA online courses relating to Professionalism (General Privacy Issues, Conflict of Interest and Commitment). Fellows are expected to attend lectures in the Medical Center on ethics, medical errors, professionalism, and other pertinent topics (Fellowship Focus series). Core competencies are imbedded in the curriculum and reviewed with fellows at the start of each rotation. Lecture series are reviewed for content to ensure that all core competencies are addressed during training.

4 – Evaluation of Fellows

A. Methods of Evaluation

Monthly Evaluations are conducted using the following guidelines of the American Board of Internal Medicine Form for Evaluation of Clinical Competence, American Board of Medical Specialties Generic Form for Global Ratings of Resident Performance. Humanistic qualities and the need to be the primary care advocate for patient's needs are emphasized. All monthly evaluations are reviewed by the Program Director.

360-Degree Evaluations are performed by nurses, social workers, nutritionists and any other staff who have significant contact with the fellow during their clinical duties in the hospital, clinics or dialysis units (these are completed every 6 months and reviewed by the Program Director).

Ambulatory Evaluations are performed every 6 months. The fellow's performance in the Nephrology Continuity Clinic and Chronic Dialysis Ambulatory Experience are reviewed by supervising attending physicians.

Summary Competency Evaluations are performed every six months. Fellows meet with the Program Director to review evaluations and a written document is prepared. Furthermore, every two to three months the Program Director meets with all trainees to review program goals and to address any issues that may arise in the operation of the program. In this way, the program maintains a dynamic state that allows change to occur to meet the needs of trainees.

In-Service Examination: At the end of the first year of training, fellows take a mock board examination (in-service examination) to determine their level of knowledge acquisition during the first year of training. Results of the examination are used to focus their education on any deficiencies.

Nephrology Research Evaluation: In the second year, a nephrology research evaluation is reviewed with the fellows by the supervising mentor.

The Program Director may receive informal comments regarding fellows that may merit documentation.

Fellows may be able to view their written evaluations at any time. Fellows will be advanced to positions on the basis of satisfactory progressive scholarship and professional growth. In the event of an adverse annual evaluation, fellows are offered the opportunity to address judgments of academic deficiencies or misconduct with the Division Chief or the head of the Graduate Medical Committee.

B. Evaluation Schedule

Monthly: Consult Eval
Biannual: 360° Eval, Clinical Eval, Dialysis Eval, Competency Summary
Yearly: Research Eval, Inservice Eval

C. Attributes Assessed in Evaluations (Core Competencies)

The board defines the certifiable Nephrologist at the completion of required training as being competent to provide comprehensive and specialized medical care based on a high standard of demonstrated component skills. These skills should clearly exceed those demonstrated by the certified Nephrologist.

Specifically, the Board asks program directors and their faculties to evaluate the following components of clinical competence:

Patient Care

These refined abilities include: (a) obtaining appropriately directed medical histories that are precise, logical, thorough and reliable; (b) conducting expert, focused physical examinations that elicit subtle findings and are directed toward the patient's problems; and (c) demonstrating understanding and proficiency while minimizing risk and discomfort to patients in the performance of diagnostic and technical procedures.

Evaluation of key procedures include percutaneous renal biopsy of both autologous and transplanted kidneys, placement of temporary vascular access for hemodialysis or continuous renal replacement therapy, acute and chronic hemodialysis, peritoneal dialysis, continuous renal replacement therapy, and urinalysis. The evaluation will take into account the length of the fellow's training.

Specific elements include:

- Medical Interviewing (history taking)
- Physical Examination
- Diagnostic Studies (selection, implementation)
- Synthesis of clinical data, differential diagnosis
- Develop management plan
- Prescribe, perform essential procedures
- Counsel patients, providing information needed to understand illness, prevent disease and specifically discuss issues relating to renal replacement therapy
- Demonstrate clinical judgment
- Provide care sensitive to culture, social circumstances
- Use information technology to optimize care
- Respect the patient's privacy and autonomy

Medical Knowledge

This is defined as the specialized, current basic and clinical science knowledge necessary to function as an expert clinical nephrologist. (This includes a broad base of knowledge of the pathogenesis, natural history and management of congenital and acquired diseases of the kidney and urinary tract; renal physiology; disorders of fluid, electrolyte and acid base regulation; normal and disordered mineral metabolism; acute and chronic renal failure; the management of patients receiving immuno-suppressive therapy; and the management and diagnosis of severe hypertension.

The clinical nephrologist also must be proficient in the principles and applications of various forms of renal replacement therapy including the management and systems operations of hemodialysis, peritoneal dialysis and renal transplantation).

Medical knowledge is assessed on each rotation as well as in a yearly inservice examination that provides feedback both to the trainee as well as to the program regarding deficiencies in specific content issues.

Practice-Based Learning and Improvement

These are demonstrated skills that include: (a) the ability to self-evaluate and improve upon one's own performance, (b) incorporation of feedback into improvement, and (c) effective use technology to manage information for both patient care and self-improvement.

Interpersonal and Communication Skills

The Nephrology Program emphasizes of the humanistic qualities of this component of clinical competence. This includes the ability establish highly effective, humanistic and therapeutic relationships with patients and families. This includes demonstration of listening to patients, narrative and non verbal skills, and education and counseling of patients, families, and colleagues. These issues are addressed in conferences dealing with difficult decision-making in Nephrology.

Professionalism

This includes demonstrating respect, compassion, integrity, and honesty. It includes teaching and role modeling responsible behavior; commitment to self-assessment—where the fellow willingly acknowledges errors; consistently considers needs for patients, families and colleagues and the need to be the patient's primary care advocate.

Systems-Based Learning

This includes demonstration of effective access/utilization of outside resources, effective use of systematic approaches to reduce errors and improve patient care, and enthusiastic assistance in developing systems improvement.

Moral and Ethical Behavior

The high standard of ethical and moral behavior is evaluated as satisfactory or unsatisfactory. This implies the consistent demonstration of a high standard of moral and ethical behavior expected within the clinical setting and of the medical profession. The ABIM considers it unethical for a physician to refuse to treat a patient solely on the basis of that patient's disease when that disease is within the physician's area of competence.

Overall Clinical Competence as a Specialist in Nephrology

This represents the supervising attending physician's overall assessment of the degree to which the fellows possesses the knowledge, skills, and attitudes essential for certification by the American Board of Internal Medicine also taking into context the amount of training. In the evaluation of these competencies there is an implicit commitment to scholarship: to maintain and update clinical skills throughout one's professional career, to acquire new knowledge through computer access and by reading the current medical literature, to participate in the design and conduct of clinical studies or related research, to attend scientific and clinical meetings for nephrologists and to evaluate critically the new medical scientific information relevant to the subspecialty.

360 Degree Evaluation

Fellows are evaluated by nursing, social worker, and nutrition staff every six months. Fellows are evaluated on patient care, medical knowledge, practice-based learning improvement, interpersonal and communication skills, professionalism and systems-based practice. Evaluations are on a 1-9 scale.

5 – Evaluation of Teaching and Faculty Members

Fellows complete a standardized evaluation form every month for supervising attendings involved in monthly rotations. Every six months, fellows evaluate faculty teaching and performance for the Nephrology Continuity Clinic and the Outpatient Dialysis Ambulatory Care Experience.

The following aspects of teaching and faculty performance are evaluated:

1. Relationship with Trainees, Supportive
 - Was supportive
 - Was approachable
 - Was patient
 - Was empathetic
2. Feedback
 - Provided effective feedback in a clear, timely, and specific manner
 - No feedback to individuals from team
 - Feedback presented in inappropriate, humiliating manner
 - Gives specific and timely feedback on remediable problems
 - Gives positive feedback when and where appropriate
3. Teaching Skills, Autonomy: Provided an appropriate balance between independence and supervision
4. Teaching Skills, Bedside Teaching: Skillfully demonstrated medical interview and physical diagnosis techniques at the bedside
5. Teaching Skills, Communication of Knowledge
 - Effectively communicated medical knowledge in presentations
 - Effectively communicated medical knowledge in articulation of clinical reasoning
 - Too much information, no summary points or poor flow of case discussion
 - Explains clearly, presents material in an organized manner, summarizes, emphasizes what is important and communicates what is expected to be learned
6. Teaching Skills, Expectations: Set clear expectations
7. Teaching Skills, Enthusiasm
 - Was enthusiastic about teaching
 - Teaching appeared an additional chore; rounds were passive and uninteresting
 - Dynamic and energetic, enjoys teaching; has an interesting style of presentation that stimulates interest in the subject
8. Teaching Skills, Organization: Was organized for teaching
9. Teaching Skills, Problem Solving: Stimulated problem solving, asked effective questions
10. Role Modeling, Clinical Judgment: Served as a role model for clinical judgment
11. Role Modeling, Collegial Relationship
 - Served as a role model for relationships with other health care professionals
 - Team functioned poorly, poor communication, low morale
 - Creates atmosphere which strengthens team work; goals of team clearly identified, encourages openness

12. Role Modeling, Evidence-Based Medicine: Served as a role model for use of medical evidence, e.g. from the medical literature
13. Role Modeling, Patient Care Coordination
 - Served as a role model for coordination of patient care; cost-effective use of health care systems
 - Disregards input from health care team. Fails to use alternative sites of care.
 - Uses resources of entire health care team. Demonstrates appropriate, effective communication.
14. Role Modeling, Patient Relationships
 - Served as a role model for relationships with patients/families
 - Lacked humanism and sensitivity with patients/families; did not value patient perspective
 - Demonstrated effective and compassionate care in communications with patients and families
15. Overall Teaching Skills
 - What suggestions would you give this teaching faculty member to improve his/her teaching?
16. Lecture Skills
 - What suggestions would you give this teaching faculty member to improve his/her conference lectures?
17. Teaching Skills, Overall: Overall teaching effectiveness
18. Confidential Comments

6 – Evaluation of the Program

At three month intervals, the program director and/or associate program director meets with the fellows group to elicit feedback on the day-to-day operation of the fellowship program. Feedback on each rotation is elicited as well as feedback regarding each attending and their performance as a teacher. As much as possible, comments are acted upon to improve the performance of the program. In addition, the fellows' feedback is brought to the attention of the Division Chief to address any larger divisional issues.

Every six months a detailed evaluation survey addressing the performance of the program is given to the fellows. Fellows who have graduated from the program are also asked to fill out a post-graduate effectiveness survey to determine if the program is adequately preparing fellows for practice.

A program effectiveness committee consisting of the program director, associate program director, division chief, one additional faculty member, and 2 fellows (one from each year of training) meets regularly to discuss the operation of the program and any needed changes.

7 – Procedural Skills: Teaching and Evaluation

Fellows use an electronic on-line database to log procedures for vascular access placement and native and transplant renal biopsies. The supervising teaching faculty member evaluates the fellow's performance of the procedure. Performance is reviewed periodically to ensure competency and safety. The evaluation will take into account the length of the fellow's training.

Evaluation of key procedures includes:

- percutaneous renal biopsy of autologous and transplanted kidneys
- placement of temporary vascular access for hemodialysis or continuous renal replacement therapy
- acute and chronic hemodialysis
- peritoneal dialysis
- continuous renal replacement therapy
- urinalysis

Satisfactory performance of percutaneous biopsy of autologous and transplant kidneys entails: knowledge of indications for the procedure, obtaining informed consent, performance of the procedure itself including minimizing patient discomfort, and interpretation of results of the biopsy

Satisfactory placement of vascular access entails: knowledge of informed consent, proper Seldinger technique, knowledge of vascular anatomy, minimizing patient discomfort, as well as functional catheter placement

Satisfactory performance of acute and chronic dialysis entails: knowledge of proper indications for hemodialysis, knowledge of first dialysis precautions, writing of dialysis orders which includes choosing dialysis filters, estimating dry weight and modification during special circumstances (immediate allograft dysfunction), choosing dialysate composition, understanding and treatment of complications, and modifying dialysis prescription for inadequate kinetics in chronic hemodialysis patients

Satisfactory performance of peritoneal dialysis entails: knowledge of proper indications of peritoneal dialysis, writing orders for peritoneal dialysis which includes dialysis prescription (volume of dialysate, frequency of exchanges, and use of different hypertonic solutions), understanding and treatment of complications, and modifying dialysis prescription for inadequate kinetics in chronic peritoneal dialysis patients

Satisfactory performance of continuous renal replacement therapy entails: knowledge of proper indications of continuous renal replacement therapy, writing orders for continuous renal replacement therapy (flow rate of dialysate, choosing ultrafiltration rate, choosing dialysate composition including the use of bicarbonate based solutions), understanding and treatment of complications, and modifying dialysis prescription for inadequate clearance in patients undergoing continuous renal replacement therapy

Satisfactory performance of urinalysis includes: correct performance of urinalysis and interpretation of findings, and knowledge of limitations of interpretation as applied to patient care

8 – Supervision and Lines of Responsibility

The program director coordinates all aspects of the nephrology fellows' education and training, including their supervision by faculty members. Fellows are provided with responsibilities consistent with their level of training. Every patient examined, and every procedure or test performed is either done under the direct supervision of a faculty member or is reviewed with a faculty member. Faculty members are directly responsible for ensuring that resident procedures are performed to the high standards set by the Program and that appropriate documentation is completed (including documentation for resident credentialing). Appropriate faculty supervision is provided during all educational experiences.

Specific mechanisms for proper supervision of residents:

A. Clinical Training

Nephrology fellows round and present clinical cases in teaching rounds, Nephrology Continuity experience, and Outpatient Dialysis Ambulatory experience and receive one-on-one instruction and feedback in history taking, physical examination and in-patient and outpatient management of nephrology patients. These case presentations may include review of clinical data, urinalysis, review of pathologic specimens, and imaging data. Nephrology teaching faculty members interview, examine and discuss assessment and plans with the nephrology fellows for all inpatient consultations, nephrology continuity clinic outpatients, and outpatient dialysis ambulatory patients. All inpatient consultations and follow up care, Nephrology Outpatient Clinic visits, and Outpatient Dialysis patients are discussed and supervised by Nephrology teaching faculty members. All outpatient supervision, whether in the Nephrology Outpatient clinic or for Outpatient Dialysis Ambulatory experience is directly supervised with the attending present. During the Nephrology Consultation rotations, the Nephrology fellow directs a team of residents, and medical students. The nephrology fellow is responsible for organization of rounds, assisting the attending physician with the education of the Internal Medicine residents and medical students, and supervising the Internal Medicine residents and medical students.

B. Procedural Supervision

Procedures such as renal biopsy, urinalysis, placement of the temporary vascular access catheters, and hemodialysis and peritoneal dialysis procedures are directly supervised by attending physicians. The placement of vascular access catheters is supervised in all cases. Fellows' advancement to independent performance of procedures is based upon successful completion of procedures as well as review with attending physicians who must certify residents based upon clinical and procedural competency.

At times, hemodialysis and peritoneal dialysis treatments may not be directly supervised. For example, an attending may not be present on site after hours. However in all cases, prior to the initiation of any procedure, the case, indications, risk and benefit for the procedure are fully discussed. At any time during the two year training period, attending physicians will be available to come in to the hospital to directly supervise any procedure.

Fellows receive formal feedback on procedural competence as part of each post rotational evaluation. An on-line log of procedures or equivalent that nephrology fellows are credentialed to perform is maintained.

C. Research

Throughout the course of any research project, Nephrology fellows meet regularly with their faculty research mentor to report their progress and discuss the design and content of their projects. Every fellow research project is supervised by a faculty mentor who is available to discuss any issues that may

arise. Residents also discuss their progress with other residents and other interested attending faculty at various research conference and clinical conferences.

D. For those pursuing research training as part of the T32 Training Grant:

Trainees receive feedback from preceptors on a regular basis. The process will be initiated by a self evaluation performed by the trainee that will be reviewed by the preceptor twice per year. Written evaluations are made after the first year to enable the trainee to identify weaknesses and strengths of his/her program. Adjustments are discussed by the preceptor and trainee and implemented for the next year. To help focus these evaluations, the mentor and trainees will set up annual training goals upon entry into the program and each year thereafter.

Successful completion of these goals will be used to gauge the progress of each trainee:

- Attendance and interactive participation in seminars. Presentation of a trainee's research in at least one appropriate seminar. This will be documented and evaluated by the mentor and placed in the trainee's file.
- Development and completion of a research project (discussed above), including progress toward publication in a peer-reviewed journal. The mentor will be responsible for documenting that the publication is taken to fruition.
- Presentation of trainee's research at a national scientific meeting.
- Writing a K-series grant (or equivalent) for review by a committee of mentors and responding to these comments.

If a trainee is not making adequate progress, mentors are required to clearly communicate this information to the advisory committee with a written description of the problem. Mentors and advisory committee will work closely to determine why a problem exists and how it can be remedied. Mentors will meet with the trainee to discuss these findings and develop a plan that will move the trainee back on track toward fulfilling these criteria.

Trainees will also be required to evaluate the Nephrology Training Program and their mentor's effectiveness. In addition, on an annual basis we contact former trainees and ask them to re-evaluate the program in light of their experiences since leaving the program.

Evaluation criteria include:

- Appropriateness and effectiveness of the core research training
- Value of any additional course work and suggestions for any courses that might be incorporated into the training program
- Knowledge gained by attending seminars, writing actual or mock grant proposals and giving research presentations
- Strengths and weaknesses of mentors

9 – Educational Goals

It is the ultimate goal of the Nephrology Subspecialty Program to educate fellows toward Board certification through excellence in educational instruction and achievement of required performance skills through implementation of the ACGME Core Competencies:

Patient Care (PC)	<ul style="list-style-type: none"> ▪ Communicate effectively and demonstrate caring and respectful behavior ▪ Gather essential and accurate information about their patients ▪ Make informed decisions about diagnostic and therapeutic interventions ▪ Develop and carry out patient management plans ▪ Counsel and educate patients and their families ▪ Use information technology to support patient care decisions and patient education ▪ Perform competently all medical and invasive procedures ▪ Provide healthcare services aimed at preventing and maintaining health ▪ Work with healthcare professionals to provide patient-focused care
Medical Knowledge (MK)	<ul style="list-style-type: none"> ▪ Demonstrate knowledge about establishing and evolving biomedical, clinical and cognate sciences and how to apply them ▪ Demonstrate an investigatory and analytic thinking approach to clinical situations ▪ Know and apply the basic and clinically supportive sciences
Practice-Based Learning and Improvement (PBLI)	<ul style="list-style-type: none"> ▪ Analyze practice experience and perform practice-based improvement activities using a systematic methodology ▪ Locate, appraise and assimilate evidence from scientific studies ▪ Obtain and use information about their own population of patients and the larger population of patients in the University ▪ Apply knowledge of study designs and statistical methods to the appraisal of clinical studies and other information on diagnostic and therapeutic effectiveness ▪ Use information technology to manage information, access online medical information and support their own education ▪ Facilitate the learning of students and other healthcare professionals
Interpersonal and Communication Skills (ICS)	<ul style="list-style-type: none"> ▪ Create and sustain a therapeutic and ethically sound relationship with patients ▪ Use effective listening skills as well as nonverbal clues ▪ Work effectively with others
Professionalism (PROF)	<ul style="list-style-type: none"> ▪ Demonstrate respect, compassion, and integrity; a responsiveness to the needs of patients and society; and a commitment to excellence ▪ Develop a commitment to ethical principles ▪ Demonstrate sensitivity and responsiveness to patients' culture, age, gender and disabilities
Systems-Based Practice (SBP)	<ul style="list-style-type: none"> ▪ Understand the greater effects of patient care and other professional practices ▪ Know how types of medical practice and delivery systems differ from one another ▪ Practice cost-effective healthcare and resource allocation that does not compromise quality of care ▪ Advocate for quality patient care and assist patients in dealing with system complexities ▪ Know how to partner with healthcare managers and healthcare providers to assess, coordinate, and improve healthcare and know how these activities can affect system performance

10 – Training Milestones: *Year One*

The process of training fellows in Nephrology is that of graded responsibility and development. While the types of rotations as well as clinical and research experiences are similar through the training program, the expectations and allotment of time varies significantly. This progress is detailed in the subsequent section, training milestones. Specific rotation curriculum goals are detailed in a separate section.

The first year of the fellowship consists of intensive training in clinical nephrology to develop the fundamental skills and knowledge required to become an outstanding clinical nephrologist.

First year fellows rotate on the following assignments (specific curriculum and goals for each rotation are listed below):

- Nephrology transplant rotation
- Inpatient consultation rotation (acute and chronic patients)
- Outpatient dialysis rotation
- Outpatient clinic rotation
- Outpatient continuity clinic
- Transplant continuity clinic
- Hemodialysis continuity experience
- Peritoneal dialysis clinic

Fellows will become proficient in the differential diagnosis and management of common nephrologic diseases and in procedural skills such as supervision of dialysis (hemodialysis, peritoneal dialysis and continuous renal replacement therapy), placement of temporary catheters for vascular access, performing native and renal transplant biopsies, and performance and interpretation of urinalysis.

It is expected that the first year of training will acclimate trainees with the procedures and practice of Nephrology in a very structured and supervised program. Trainees will acquire expertise and move into a more independent role.

Fellows have Nephrology Outpatient Continuity Clinic one half-day per week. Our continuity clinic is a referral center for patients who have renal transplants, glomerular diseases, recurrent kidney stones, refractory and secondary forms of hypertension, genetic kidney diseases, and other aspects of general nephrology. Patients are referred from a diverse geographical, racial and socioeconomic base that includes rural and metropolitan areas. Fellows are assigned to a dedicated attending who is responsible for the teaching of the fellow throughout the clinic experience and who sees all patients along with the fellow. Per clinic session, fellows will generally see 2-3 new patients and 4-6 established patients.

Fellows provide continuity of care for outpatient hemodialysis and peritoneal dialysis patients by following patients longitudinally during their entire fellowship with the supervision of a Nephrology Attending. In general, fellows provide longitudinal care for 6 hemodialysis patients.

Fellows also participate in transplant clinic and follow post-transplant patients longitudinally during their training.

Educational Goals

Please see specific rotations for more details regarding educational purpose, types of clinical encounters, procedures and services, reading lists and other educational resources, methods of evaluation, and supervision and lines of responsibility. The curriculum is reviewed at the start of each rotation. Medical problems, health promotion, cultural, socioeconomic, ethical, occupational, environmental, and behavioral issues in rotations are integrated for learning goals and objectives for each rotation and learning

experience. Other educational resources will be provided such as funding for educational materials and attendance at national conferences. The Division has available a Nephrology Board review course on DVD and CD that is available to supplement conferences.

Instruction will be given on social and economic impact of medical decision on patient and society, quality assessment and improvement and risk management. The Nephrology Program will give the fellow the opportunity to achieve cognitive knowledge, procedural skills, interpersonal skills, professional attitudes and behaviors, humanistic qualities, and practical experience to develop into an outstanding Nephrologist.

Topics Covered by Formal Instruction (didactic and clinical based)

General Nephrology

- Disorders of fluid, electrolyte, and acid-base regulation
- Acute renal failure
- Chronic renal failure and its management including nutritional management of uremia
- Hypertensive disorders – normal and abnormal blood pressure regulation
- Renal disorders of pregnancy
- Urinary tract infections
- Tubulointerstitial renal diseases, inherited diseases of transport, cystic diseases, and other congenital disorders
- Glomerular and vascular diseases, glomerulonephritides, diabetic nephropathy
- Renal anatomy, physiology, and pathology
- Congenital and acquired diseases of the kidney and urinary tract renal diseases associated with systemic disorders, diabetes and collagen-vascular diseases
- Normal mineral metabolism, metabolic bone disease, renal osteodystrophy and nephrolithiasis
- Clinical pharmacology, drug metabolism and pharmacokinetics and the effects of drugs on renal structure and function; disorders of drug metabolism and renal drug toxicity

Immunology

- Basic principles
- Immunologic mechanisms of renal disease
- Fundamental aspects of diagnostic laboratory immunology relevant to renal diseases and transplantation
- Pharmacology and biology of immunosuppressive medications in the treatment of renal diseases and in transplantation

Transplantation

- Biology of transplantation rejection
- Indications for and contraindications to renal transplantation
- Principles of transplant recipient evaluation and selection
- Principles of evaluation of transplant donors, both live and cadaveric, including histocompatibility testing
- Principles of organ harvesting, preservation, and sharing
- The pathogenesis and management of urinary tract infections
- The pathogenesis and management of acute renal failure
- Indications for and interpretations of radiologic tests of the kidney and urinary tract; and
- Disorders of fluids and electrolytes and acid-base balance specific to transplantation
- Indications for and interpretations of radiologic tests of the kidney and urinary tract

End-Stage Renal Disease/Dialysis

- The kinetic principles of hemodialysis and peritoneal dialysis
- The indications for each mode of dialysis

- The short-term and long-term complications of each mode of dialysis and management
- The principles of dialysis access (acute and long-term vascular and peritoneal), including indications, placement techniques, complications, diagnosis (radiology), and treatment of complications (e.g. angioplasty of vascular access)
- Urea kinetics and protein catabolic rate
- Dialysis modes and their relation to metabolism
- Nutritional management of dialysis patients
- Dialysis water treatment, delivery systems, and reuse of artificial kidneys
- The artificial membranes used in hemodialysis and biocompatibility; and
- The psychosocial and ethical issues of dialysis
- Aspect of long term-care (e.g. renal osteodystrophy-bone biopsy) for longitudinal follow- up

Geriatric Aspects of Nephrology

- Fundamentals of pharmacology as it relates to alterations in drug metabolism in the elderly
- Specific aspects of hemodialysis, peritoneal dialysis, glomerular diseases, hypertension, transplantation and other areas of nephrology as it relates to the geriatric patient
- Specific psychosocial and ethical issues regarding the geriatric patient
- Specific societal and systems issues related to geriatric patients

Specific Competency-Based Goals (by Rotation Subtype)

PC = Patient Care

MK = Medical Knowledge

PBLI = Practice-Based Learning and Improvement

ICS = Interpersonal and Communication Skills

PROF = Professionalism

SBP = Systems-Based Practice

Continuity Clinics/Outpatient Rotations/Dialysis Rotations	
PC	<ul style="list-style-type: none"> ▪ Evaluate a mix of patients with different diseases for initial visit and in follow-up. ▪ All history and physical examinations to be complete and accurate in terms of general medicine portion. Specific issues related to renal diagnosis to be better detailed as experience is gained. ▪ We will acquaint the fellow with proper diagnostic and therapeutic steps.
MK	<ul style="list-style-type: none"> ▪ Read widely regarding patient encounters. ▪ Clinical cases are used as basis for case conference; expected to utilize the medical literature in preparing cases for presentation. ▪ By completion of year, have the knowledge to formulate a complete differential diagnosis, outline required studies needed to identify causative conditions, and recognize the appropriate care plan for each individual.
PBLI	<ul style="list-style-type: none"> ▪ All fellows will gain experience in analysis of practice patterns and decision-making through critique in the clinic and discussions in conference. ▪ Through discussion of the medical literature, be able to recognize basic medical reports that support decision-making and technologic applications.
ICS	<ul style="list-style-type: none"> ▪ Have ability to interact in a respectful and productive way with all patients, colleagues and support staff. Faculty spend considerable time with patients and fellows and provide ready feedback regarding those interactions. ▪ Our area of practice is consultative; all communications with other physicians via written work (dictations) or direct verbal contact to be appropriate and effective.
PROF	<ul style="list-style-type: none"> ▪ From initial time of training, maintain a highly professional attitude with patients, medical staff, peers and faculty. ▪ Master need for clear and concise transmission of information to those also participating in any patient's care.
SBP	<ul style="list-style-type: none"> ▪ Faculty recognize that care of the patient with renal disease can be complex and that patients at UVa may have different types of medical problems than at other institutions. In that light, different types of diagnostic tests carrying different risks/benefits and approaches to therapy

	<p>must be mastered. Trainees are expected to become acquainted with the full spectrum of diagnostic studies employed at UVa and to be able to integrate those capabilities into their discussions with physicians from outside of the university.</p> <ul style="list-style-type: none"> ▪ Become familiar with the regulations/requirements of our regional healthcare insurers and thereby become facile in selecting appropriate medical care for most situations. ▪ Integrate into overall patient care other support services such as nutritional and social services. Nutritional support specific for CKD and ESRD patients is provided on site. A renal social worker is present on site to facilitate care and minimize non-medical barriers to the provision of optimal care.
Consultative Service/Transplant Service	
PC	<ul style="list-style-type: none"> ▪ Evaluate all patients for initial evaluation and in follow-up during their hospital stay. ▪ All history and physical examinations to be complete and accurate in terms of general medicine portion. Specific issues related to the renal diagnosis to be better detailed as experience is gained. ▪ We will acquaint the fellow with proper diagnostic and therapeutic steps. ▪ Convey all medical decisions to the consulting service and serve as liaison to the renal clinic for follow-up after discharge. ▪ While on call from home, be responsible for calls to the hospital operator from patients followed by the renal division. At the outset of fellowship, we regularly review all decisions and consult service faculty will readily assist in this process as needed. ▪ By completion of year, recognize renal emergencies, direct appropriate renal care, and provide patients with needed medical support.
MK	<ul style="list-style-type: none"> ▪ Read widely regarding patient encounters. ▪ Clinical cases from the consult service are used as basis for our case conference; trainees are expected to utilize the medical literature in preparing cases for presentation. ▪ By completion of year, have the knowledge to formulate a complete differential diagnosis, outline required studies needed to identify causative conditions, and recognize the appropriate care plan for each individual.
PBLI	<ul style="list-style-type: none"> ▪ All fellows will gain experience in analysis of practice patterns and decision-making through critique in the clinic and discussions in conference. ▪ Through discussion of the medical literature, be able to recognize basic medical reports that support decision-making and technologic applications. ▪ Daily evaluation of hospitalized patients, immediate feedback and faculty supervision provide excellent growth in this competency.
ICS	<ul style="list-style-type: none"> ▪ Have ability to interact in a respectful and productive way with all patients. Faculty spend considerable time with patients and fellows and provide ready feedback re: those interactions. ▪ Our area of practice is consultative; all communications with other physicians via written work (dictations) or direct verbal contact to be appropriate and effective.
PROF	<ul style="list-style-type: none"> ▪ From the initial time of training, maintain a highly professional attitude with patients, medical staff, peers and faculty. ▪ Master need for clear and concise transmission of information to those also participating in any patient's care.
SBP	<ul style="list-style-type: none"> ▪ Faculty recognize that care of the patient with renal disease can be complex and that patients at UVa may have different types of medical problems than at other institutions (e.g. our high exposure to patients requiring continuous renal replacement therapy). In that light, different types of diagnostic tests carrying different risks/benefits and approaches to therapy must be mastered. Trainees are expected to become acquainted with the full spectrum of diagnostic studies employed at UVa and to be able to integrate those capabilities into their discussions with physicians from outside of the university. ▪ Become familiar with the regulations/requirements of our regional healthcare insurers and thereby become facile in selecting appropriate medical care for most situations. ▪ Integrate into overall patient care other support services such as nutritional and social services (see above).

Research Project	
PC	<ul style="list-style-type: none"> ▪ Most fellows will participate in clinical research. ▪ Similar to other venues, be capable of evaluating a mix of patients including normal controls and individuals enrolled in clinical trials. ▪ All history and physical examinations to be complete and accurate in terms of the general medicine portion. Specific issues related to the renal diagnosis will be better detailed as the fellow gains experience.
MK	<ul style="list-style-type: none"> ▪ Read widely regarding patient encounters. ▪ Research projects involving patient care are viewed as excellent learning opportunities; trainees will be expected to read in-depth regarding all clinical aspects of their project.
PBLI	<ul style="list-style-type: none"> ▪ Gain experience in the performance of research protocols with human subjects and the analysis of data derived from those studies. ▪ Through discussions with research mentor, be able to recognize basic medical reports that support decision-making and to interpret physiological responses to renal investigations.
ICS	<ul style="list-style-type: none"> ▪ Have ability to interact in a respectful and productive way with all study subjects. Faculty spend considerable time with subjects and fellows and provide direction in terms of research matters. ▪ All communications with the patient during their participation and with other physicians via written work (dictations) or direct verbal contact to be appropriate and effective by conclusion of the first year.
PROF	<ul style="list-style-type: none"> ▪ From initial time of training, maintain a highly professional attitude with patients, medical staff, peers and faculty. ▪ Have mastered the need for clear and concise transmission of information to those also participating in any patient's care.
SBP	<ul style="list-style-type: none"> ▪ The study of clinical research subjects requires integrated care from nurses, dieticians, physiologists, physicians and statisticians. Become familiar with the regulations/requirements of our entire research operation and thereby become facile in facilitating productive, safe and valuable research within the UVa Health System.

11 – Training Milestones: *Year Two*

The second year of training is designed to further prepare the fellow for a career in academic nephrology or private practice by: (a) developing more extensive experience in outpatient and inpatient nephrology, (b) developing independence as a clinical Nephrologist, and (c) engaging in nephrology research and scholarly activity.

Currently, second year fellows engage in basic science research or clinical research. Each fellow chooses the type of research and a mentor from a wide variety of research areas. This is begun in the first year of training. Fellows' research is presented at divisional meetings (Renal Grand Rounds and Fellows Conference) and, if possible, at national meetings. Research may result in peer reviewed publications.

Second year nephrology fellows continue to provide longitudinal care to hemodialysis, peritoneal dialysis, and renal transplant patients with supervising teaching faculty members throughout the year to gain additional longitudinal experience with outpatients. Second year fellows continue in the Nephrology Outpatient Continuity Clinic.

The second year fellows have important roles in determining the content and organization of the conferences that occur within the division. It is anticipated that trainees in their second year will assume a greater role in decision making and will offer supervision to first year trainees.

One second year fellow serves as the fellow representative for educational curriculum issues (Chief Fellow). This fellow helps the program director review educational goals and effectiveness of implementation of these goals. The fellow representative is present for dedicated faculty meetings regarding curriculum issues. A second year fellow helps with developing the call schedule for first and second year fellows.

Educational Goals

Specific educational goals for the second year of training are similar to and build upon the goals of the first year. However, second year trainees are expected to take a more independent role in clinical decision making and to focus more of their attention on teaching first year fellows, residents and students.

The curriculum topics listed for the first year of the training program, covered in clinical and didactic settings, are the same for second year fellows.

Specific Competency-Based Goals (by Rotation Subtype)

PC = Patient Care

MK = Medical Knowledge

PBLI = Practice-Based Learning and Improvement

ICS = Interpersonal and Communication Skills

PROF = Professionalism

SBP = Systems-Based Practice

Continuity Clinics/Outpatient Rotations/Dialysis Rotations	
PC	<ul style="list-style-type: none"> ▪ Continue to evaluate a mix of patients for initial visit and in follow-up (see patient mix above). ▪ By completion of year, all history and physical examinations to be complete and accurate in terms of the entire renal evaluation. ▪ Be able to establish appropriate diagnostic and therapeutic care plans and present those concepts to the faculty.
MK	<ul style="list-style-type: none"> ▪ Continue to read widely regarding patient encounters. ▪ By completion of year, be able to site relevant literature and provide a scientific basis for decisions.

PBLI	<ul style="list-style-type: none"> ▪ All fellows will gain experience in analysis of practice patterns and decision-making through critique in the clinic and discussions in conference. ▪ Be able to recognize areas in which practice decisions may not be clear-cut and to identify proper practice through reasoning skills and re-evaluation of clinical experience.
ICS	<ul style="list-style-type: none"> ▪ Have ability to interact in a respectful and productive way with all patients. ▪ Be able to discuss patient care with referring physicians in a collegial and concise fashion. ▪ By completion of year, all written and verbal communications will be at level of a faculty member.
PROF	<ul style="list-style-type: none"> ▪ Maintain a highly professional attitude with patients, medical staff, peers and faculty.
SBP	<ul style="list-style-type: none"> ▪ Be familiar with the full spectrum of diagnostic studies employed at UVa and be able to integrate those capabilities into discussions with physicians from outside of the university. ▪ Recognize the regulations/requirements of our regional healthcare insurers and thereby be facile in selecting appropriate medical care for most situations.
Consultative Service/Transplantation Service	
PC	<ul style="list-style-type: none"> ▪ Evaluate all patients for initial evaluation and in follow-up during their hospital stay. ▪ All history and physical examinations to be complete and accurate in terms of the renal diagnosis and all related issues. ▪ Convey all medical decisions to the consulting service and serve as the liaison to the renal clinic for follow-up after discharge. ▪ While on call from home, be responsible for calls to the hospital operator from patients followed by the renal division. ▪ By completion of year, recognize renal emergencies, direct appropriate renal care, provide patients with needed medical support, and document proper follow-up.
MK	<ul style="list-style-type: none"> ▪ Read widely regarding patient encounters. ▪ By completion of year, have the knowledge to independently formulate a complete differential diagnosis, outline required studies needed to identify causative conditions, and recognize the appropriate care plan for each individual. ▪ Presentations to faculty will be thorough, thoughtful and contain predictions as to patient outcomes/performance. ▪ Be able to provide decisions regarding diagnostic or care plans on an independent basis before review of the case by the faculty member.
PBLI	<ul style="list-style-type: none"> ▪ Continue to gain experience in analysis of practice patterns and decision-making through critique in the clinic and discussions in conference. ▪ Through discussion of the medical literature, refine skills such that analysis of patient care and outcomes is an integral part of decision-making abilities.
ICS	<ul style="list-style-type: none"> ▪ Have ability to interact in a respectful and productive way with all patients. ▪ All communications with other physicians via written work (dictations) or direct verbal contact to be appropriate and effective.
PROF	<ul style="list-style-type: none"> ▪ From initial time of training, maintain a highly professional attitude with patients, medical staff, peers and faculty. ▪ Have mastered need for clear and concise transmission of information to those also participating in any patient's care.
SBP	<ul style="list-style-type: none"> ▪ Be familiar with the full spectrum of diagnostic studies employed at UVa and be able to integrate those capabilities into their discussions with physicians from outside the university. ▪ Recognize the regulations/requirements of our regional healthcare insurers and thereby be facile in selecting appropriate medical care for most situations.
Research Project	
PC	<ul style="list-style-type: none"> ▪ When applicable, actively enroll subjects and perform all history and physical examinations. ▪ Examinations to be complete and accurate and reflect the specific issues that relate to the area of investigation.
MK	<ul style="list-style-type: none"> ▪ Read widely regarding subject encounters.
PBLI	<ul style="list-style-type: none"> ▪ Continue to gain experience in performance of research protocols with human subjects and analysis of data derived from those studies.

	<ul style="list-style-type: none"> ▪ Be able to integrate scientific data into decision-making and interpret physiological responses to investigations.
ICS	<ul style="list-style-type: none"> ▪ Interact in a respectful and productive way with all study subjects, study coordinators and support staff.
PROF	<ul style="list-style-type: none"> ▪ Maintain a highly professional attitude with patients, medical staff, peers and faculty.
SBP	<ul style="list-style-type: none"> ▪ Be familiar with the regulations/requirements of our entire research operation and thereby become facile in facilitating productive, safe and valuable research within the UVa Health System. ▪ Where appropriate, integrate UVa and national databases into research projects and interact with the UVa Health Evaluation System with regard to trial design and data analysis.

12 – Rotation Curriculum Goals

A. Inpatient Consult Rotation

General Description

1. During the two-year fellowship, each fellow will spend 9 one-month rotations on the inpatient consult service. This is broadly divided into an acute and chronic service depending upon the needs of the particular consultation (i.e. an acute nephrological issue versus management of chronic kidney disease or ESRD). Additional inpatient experience is offered at Augusta Medical Center, a community hospital in Fishersville, Virginia (curriculum is the same for this rotation) and at Lynchburg Nephrology. Fellows can elect to rotate at this site for one month during their training.
2. The Nephrology consult fellow is responsible for initial evaluation and subsequent management of all hospitalized patients referred for consultation. The consult fellow should oversee all patients on the service, including those being followed by medicine residents and medical students. The Nephrology consult inpatient fellow is responsible for the initial evaluation and subsequent management of all hospitalized chronic dialysis patients (hemodialysis and peritoneal dialysis). He/she will work in concert with the ward residents, medical students, and Nephrology patient care coordinator to provide the necessary care, and will be overseen by the Nephrology/Medicine ward attending.
3. The timing and frequency of rounds is at the discretion of the renal consult attending on service.
Attending Teaching Rounds: Each weekday, attendings are responsible for 30-60 minute teaching sessions separate from patient management rounds (minimum of five hours/week). Content is at the discretion of each attending and may include, but is not limited to, topics such as review of specific papers or board questions or short informal lectures on specific renal topics. Attendings may assign fellows/residents/students to prepare a discussion on a specific renal topic.
Fellow Teaching Rounds: Fellows on outpatient/elective services will present core lectures to rotating second and third year internal medicine residents and students during the month. Topics covered include hematuria, proteinuria, and chronic renal failure.
Attending Clinical Management Rounds: Attendings round with fellows, residents and students, at least daily, usually twice daily. Patients are discussed at length and examined, and treatment plans are constructed.
4. On-Call schedule:
 - The service is staffed by three fellows at all times who rotate call assignments. Generally, this averages to call approximately every third or fourth night. All call is taken from home. Duty hour requirements as specified by the ACGME are strictly adhered to:
 - Fellows do not work greater than 80 hours per week
 - Fellows do not spend more than 30 continuous hours in-house
 - Fellows are guaranteed 1 day off per week free from all educational and clinical responsibilities (averaged over a one month period)
 - Fellows are guaranteed 10 hours off duty between shifts
 - Moonlighting policy: Moonlighting is a completely voluntary function that requires written permission from the program director and is in accord with housestaff policy. Fellows are restricted from moonlighting during an inpatient rotation. Performance is monitored to ensure that moonlighting does not interfere with the required function of the fellowship. Fellows must provide a moonlighting schedule to the program director in advance.
 - During the rotation, the fellow is expected to maintain attendance and participation in all conferences and their usual half-day of clinic.

Goals and Objectives

The goals and objectives of this rotation are broadly defined by the year of training. It is expected that those fellows beginning training will have little or no experience with nephrological issues and procedures and thus require maximum supervision. Thus, for the first six months of training, all decisions regarding significant treatment issues are made in consultation with the attending Nephrologist. Furthermore, all procedures are strictly monitored and supervised to ensure proficiency. Later in the first year, as fellows gain experience, independence in decision making and procedures is expected. Second year fellows are expected to take responsibility for teaching first year fellows, residents and medical students and to provide leadership roles on the consult service.

1. Become familiar with renal anatomy and physiology in normal and aging humans.
2. Understand the pathogenesis, complications, and management of:
 - Disorders of fluid and electrolytes: water, sodium, potassium, calcium, magnesium, and phosphorus balance
 - Acid-base balance and disorders
 - Acute renal failure
 - Chronic renal failure
 - Nutritional aspects of renal failure
 - Urinary tract infection
 - Metabolic bone disease (osteitis fibrosa cystica, aluminum bone disease, osteomalacia, and beta-2 microglobulin)
 - Nephrolithiasis
 - Isolated hematuria
 - Isolated non-nephrotic proteinuria
 - Nephrotic and nephritic syndrome and the renal vascular diseases listed in the histopathology rotation goals and objectives
 - Tubulointerstitial diseases (pyelonephritis, reflux nephropathy, acute and chronic interstitial nephritis, gouty nephropathy, polycystic kidney disease)
 - Pregnancy-induced renal disease (preeclampsia, post partum renal failure and those renal diseases exacerbated by pregnancy)
 - Drug metabolism and dosing in renal failure
 - Essential, malignant, and secondary forms of hypertension
3. Become familiar with the indications for, management, and complications of various modes of dialysis to include hemodialysis, peritoneal dialysis (CAPD, CCPD, Tidal PD), and continuous dialytic therapies. Become familiar with the indications for, management, and complications of therapeutic apheresis.
4. Understand the indications for and interpretation of radiologic tests of the kidney and urinary tract to include IVP, renal US, CT scan and radio nucleotide scans, angiography and vascular access studies.
5. Procedures
 - Become familiar with the indications, technique, potential complications and/or interpretation of the following: urinalysis, acute hemodialysis catheters, percutaneous biopsy of the native kidney and transplant kidney, bone biopsy, renal ultrasound, duplex ultrasonography, Tenckhoff catheter placement, apheresis
 - Each fellow is responsible for keeping an updated log of procedures performed, countersigned by the appropriate attending. A log of all kidney biopsies should be kept. Log of other procedures should be kept until proficiency is obtained, and then signed by an attending certifying the fellow to perform the procedure without supervision. These logs are kept electronically and periodically reviewed by the program director to ensure that fellows are meeting requirements.

Recommended Reading and References

1. Brenner and Rector: The Kidney
2. Schrier: Disease of the Kidney and Urinary Tract
3. Burton David Rose: Clinical Physiology of Acid-Base and Electrolyte Disorders
4. Burton David Rose: Pathophysiology of Renal Disease
5. Daugirdas and Ing: Handbook of Dialysis
6. Nissenson and Fine: Dialysis Therapy
7. Jacob Churg: Renal Disease: Atlas of Glomerular Disease
8. Journals: Kidney International, American Journal of Kidney Disease, NEJM, Annals of Internal Medicine, Journal of the American Society of Nephrology
9. Others as suggested by Nephrology Faculty

Measurement of Competencies

Throughout the rotation, attending physicians are responsible for evaluating and review competencies of all fellows. This process begins with the start of each rotation when attendings review the curriculum and competency measurements with fellows. Expectations and goals are set and discussed. At the mid-point and at the end of the rotation, performance is reviewed with the fellow along with a detailed written evaluation. These evaluations are reviewed by the program director.

Specific competencies that are assessed include:

PC	Provision of compassionate, effective care that promotes patient well-being. Some specific issues monitored include: Performance of accurate and appropriate history and physical examinations Ability to determine appropriate diagnostic and therapeutic plans Performance of procedures specific to Nephrological practice in a proficient manner Ability to effectively and appropriately counsel patients Respect of patient privacy and autonomy
MK	Demonstration of effective application of biomedical, clinical and social skills and knowledge to the care of patients; also assessed through formal didactic teaching and examination throughout the program. Expectation of a broad-based knowledge encompassing the basic and clinical science concepts that is required to provide expert Nephrological care Expectation to read extensively throughout this rotation and to present evidence-based recommendations for diagnostic and therapeutic decision making
PBLI	Use of evidence and sound methodology to investigate, evaluate and improve patient care practices. Skills include: ability to self-evaluate and improve one's performance, and the incorporation of feedback into improvement Expectation to review outcomes of dialysis therapies and monitor their proficiency with procedural skills to improve their practice
ICS	Demonstration of these skills and effective functioning in maintaining professional and therapeutic relationships with patients and the healthcare team. Demonstration of skill in listening to patients and families and the ability to effectively educate and counsel patients on complex treatment decisions including initiation of dialysis therapies, and end-of-life issues.
PROF	Demonstration of behaviors that reflect ongoing commitment to continuous professional development, ethical practice, sensitivity to diversity and responsible attitudes.
SBP	Demonstration of understanding of contexts and systems in which health care is provided and application of this knowledge in improving health care. Familiarity with the payment structures involved in the care of patients with ESRD and acute renal failure.

B. Outpatient Consult Rotation

General Description

1. During their two years, Nephrology fellows will spend 3 months on the outpatient rotation. This is in addition to the continuity clinic that occurs one half-day per week.
2. Responsibilities
All patients seen will be discussed with the outpatient attending nephrologist, except in the transplant clinic where they will be discussed with the transplant attending nephrologist. The bulk of teaching in this rotation is during these patient encounters and discussion with faculty. It is expected that faculty will spend considerable time and effort eliciting and discussing important teaching points. Fellows are expected to review original literature to provide evidence-based care.
 - Initial evaluation and management of all walk-in patients in the Kidney Center (KC) Clinic.
 - Initial evaluation and management of KC dialysis patients with clotted vascular accesses, to include placement of temporary dialysis catheter if necessary.
 - Peritoneal dialysis clinic Wednesday morning – REQUIRED DURING THE OUTPATIENT MONTH. Fellows are also strongly encouraged to attend at other times.
 - Fellows are required to attend 2-3 transplant clinic sessions per week. These are scheduled individually with the transplant staff.
 - First call for patient problems in the KC dialysis unit.
 - Involvement and responsibility for other issues/problems in the KC dialysis unit as directed by outpatient attending.
 - To become familiar with economic and business issues pertaining to the practice of nephrology through interactions with the outpatient clinic director and managers.
 - To attend outpatient transplantation clinic on two half-day sessions per week.
 - First-year fellows will be closely supervised and over the course of training will gain independence in the management of outpatient issues. Second-year fellows will assume responsibility for diagnostic and therapeutic decision-making. In all cases, attending physicians are available and involved in patient care.
3. Call schedule: Nephrology fellows do not take call during their outpatient rotations, with the exception of covering in inpatient Transplant Service for two weekends during the month-long rotation.
4. Clinic and conferences: Participation and attendance in the previously described Nephrology conferences is expected.
5. It is anticipated that the outpatient fellow will spend a significant time studying nephrology core topics during this rotation.

Goals and Objectives

Because this rotation encompasses the breadth of Nephrology practice, the goals and objectives overlap with those of the Inpatient and Transplantation Service. Some unique goals are listed here.

1. Become familiar with the equipment, procedures, and techniques involved in chronic hemodialysis:
 - Participate in the setup, use, and breakdown of a hemodialysis machine under the supervision of one of the dialysis nurses. This may be done over a period of 1-5 days depending on the interest of the fellow.
 - Become familiar with the complications of hemodialysis systems, including water treatment.
2. Become familiar with the principles and practice of chronic hemodialysis:
 - Evaluation and selection of patients for chronic hemodialysis, and counseling regarding dialytic options

- Selection and maintenance of an appropriate dialysis prescription to include assessment of adequacy of dialysis (Kt/V) and nutrition (nPCR)
 - Evaluation and management of acute complications of dialysis to include hypotension, chest pain, dyspnea, muscle cramps, first use syndrome, vascular access problems, etc.
 - Evaluation and therapy of long-term complications including metabolic bone disease, neuropathy, arthropathy, cardiomyopathy, atherosclerosis, hypertension, and anemia
 - Drug dosing and modification during hemodialysis
 - Indications, placement, and complications of acute hemodialysis catheters
 - Indications, performance, and complications of bone biopsy for metabolic bone disease
 - Understand dialysis water treatment and delivery systems
 - Become familiar with artificial kidneys, including the issues of biocompatibility and reuse
 - Observe the placement of a vascular access in the O.R. with the vascular access surgeon
3. Become familiar with the principles, practice, and procedures of peritoneal dialysis:
- Evaluation and selection of patients for peritoneal dialysis
 - Recognize the advantages/disadvantages of the different peritoneal catheters
 - Understand the differences and advantages/disadvantages between CAPD, CCPD, IPD, and tidal peritoneal dialysis
 - Understand and write an appropriate peritoneal dialysis prescription
 - Assessment of peritoneal dialysis efficacy using the peritoneal equilibration tests (PET)
 - Assessment of adequacy of peritoneal dialysis using Kt/V
 - Evaluation and therapy of infectious complications to include peritonitis, exit site infections, and tunnel infections
 - Evaluation and management of long-term complications including low back pain, hernias, and pleural effusions
 - Understand the special nutritional requirements of peritoneal dialysis
 - Drug dosing and modification during peritoneal dialysis
 - Observe the placement of a Tenckhoff peritoneal dialysis catheter

Recommended Texts

1. Nissenson and Fine: Dialysis Therapy
2. Daugirdas and Ing: Handbook of Dialysis
3. Gokal and Nolph: Textbook of Peritoneal Dialysis

Measurement of Competencies

Throughout the rotation, attending physicians are responsible for evaluating competencies of all fellows. Fellows will work with several different attending physicians over a period ranging from a single patient encounter to more frequent interactions. To assess performance, attendings will provide written feedback for this rotation on a biannual basis. Evaluations are reviewed by the program director.

Specific competencies that are assessed include:

PC	Provision of compassionate, effective care that promotes patient well-being in multiple clinical settings (clinic, dialysis unit)
MK	Demonstration of effective application of biomedical, clinical and social skills and knowledge to the care of patients; also assessed through formal didactic teaching and examination
PBLI	Use of evidence and sound methodology to investigate, evaluate and improve patient care practices
ICS	Demonstration of these skills and effective functioning in maintaining professional and therapeutic relationships with patients and the healthcare team
PROF	Demonstration of behaviors that reflect ongoing commitment to continuous professional development, ethical practice, sensitivity to diversity and responsible attitudes
SBP	Demonstration of understanding of contexts and systems in which health care is provided and application of this knowledge in improving health care

C. Transplant Rotation

General Description

The Fellow will gain experience in the initial work-up of transplant candidates, care of patients immediately post-transplant, and long-term follow-up of patients with a functional allograft.

1. Nephrology fellows will spend a total of 3 one-month rotations on the transplant service, two months during the first year and one month during the second year.
2. Responsibilities include the initial evaluation, management, and follow-up of patients on the inpatient transplant service, including pre and post-transplant care.
3. Fellows will participate in Transplant Clinic three half-days per week during their Transplant rotations. This will be in addition to the regularly scheduled half-day of Nephrology Clinic. Fellows will also follow patients transplanted during their time on the transplant service when they return to clinic. This establishes a continuous relationship between the patient and the fellow.
4. Call schedule: Nephrology fellow takes call for nephrologic problems on the transplant service during the month of the rotation, including weekends. ACGME duty hour restrictions are strictly enforced.
5. Clinic and conferences: Participation and attendance in the usual scheduled clinic and conferences is expected.
6. It is expected that fellows will develop longitudinal care relationships with at least 20 post-transplant patients during these months.
7. It is expected that fellows will be involved in the care of at least 20 new transplant patients during their training.
8. First-year fellows are expected to focus their time on the inpatient service and, if possible, to attend clinic if they are available. Second-year fellows are expected to devote more time toward the outpatient management of transplant patients.
9. Fellows rotating through transplantation are expected to develop incremental knowledge in the basics of transplantation during their two-year fellowship, as outlined above. Learning objectives are discussed by the transplant attending at the beginning of each rotation and are based upon the month in the transplant clinic:
 - Month 1: Focus on immunosuppression (management, dose, complications), pre-transplant evaluation, early allograft dysfunction, management of acute renal failure/delayed graft function, pre-transplant evaluation.
 - Month 2: Focus on immunobiology of transplantation, post transplant infections, donor evaluation.
 - Month 3: Focus on long term allograft care, bone disease, cardiac complications interpretation of allograft biopsies and interpretation of allograft imaging studies.

Goals and Objectives

1. Become familiar with the principles and practice of the following:
 - Selection and evaluation of transplant candidates
 - Preoperative evaluation of prospective transplant recipients and prospective organ donors
 - Organ harvesting and preservation
 - Postoperative management of transplant recipients, including immunosuppressive therapy
 - Diagnosis and therapy of all forms of rejection including hyperacute, acute cellular, acute vascular,

and chronic rejection, to include the interpretation of Doppler ultrasound, radio nucleotide scans, and renal histopathology

- Biology and immunology of histocompatibility testing
- Mechanism of action and use of immunosuppressive agents
- Recognition and management of short and long-term complications of transplantation such as postoperative complications, infectious complications, etc.
- Psychosocial issues in of organ donation and transplantation
- Long-term care and follow-up transplanted patients in the ambulatory setting

2. Outpatient Transplantation Experience

Fellows spend three half-day sessions per week in the transplant clinic during their inpatient transplant rotation (3 months) and two half-day sessions per week in the transplant clinic during their outpatient months (3 months).

The goal of the Outpatient Transplant Clinic Rotation is to apply principles of clinical transplantation toward care of patients in the outpatient setting. The organization of the transplant clinic is structured to focus staff on the education of specific outpatient transplant related issues that pertain to these types of patients:

Pre-transplant recipients

 New evaluations (initial evaluation)

 Living-related donor (LRD) evaluations (just prior to surgery)

 Chronic end-stage renal disease (ESRD) evaluations (waiting list)

Pre-transplant donors

Early post-transplant recipients

Late post-transplant recipients

At the end of the clinic, a period of 15 to 30 minutes is reserved to discuss outstanding issues related to the patients seen and for discussion of papers or general topics that pertain to the clinic focus. Evidence-based medicine will be emphasized. Attending physicians will provide papers for general discussion early in the training; however, fellows with advanced training will be responsible for leading discussions and providing evidence through literature searches.

Pre-Transplant Recipients

New evaluations – The objective is to educate the fellow on subjects that include but are not limited to: identification of cardiovascular risk factors for surgery, pre-transplant patient teaching, contraindications to transplantation, HLA crossmatching, preparing recipients for transplants in situations where the living donor is ABO incompatible or where the recipient has anti-HLA antibodies to the donor (high risk pre-transplant evaluation and management). Following the initial evaluation, subsequent evaluations will depend upon whether they are candidates for living related/unrelated donation or not.

LURD/LRD Final Evaluation – Following the initial evaluation, subsequent evaluations are done prior to surgery. The objective is to provide the fellow with the experience of management of patients in final preparation for transplantation. Fellows will receive educational experience in management of potential electrolyte abnormalities that may cause intraoperative complications, adjusting medications (discontinue ACEI; add beta blockers if indicated) just prior to surgery, and managing blood pressure just prior to surgery.

Chronic ESRD Evaluations – Following the initial evaluation, those not candidates for LURD/LRD and who are on a transplant waiting list are seen. The objective is to provide the fellow with specific educational experience from patients waiting for transplantation but receiving dialysis. Special complications are seen in this group of patients that relate to dialysis, vascular or peritoneal access, infections or cardiac problems that may have influence on transplantation and/or outcomes.

Pre-Transplant Donors

The objective is to provide an educational experience in donor evaluation, donor kidney function

evaluation. The fellow will also receive education on situations that would be a contraindication to donation and risks/benefits.

Early Transplant Recipients (within the first post-transplant year)

The objective is to provide an educational experience in early post-transplant care that includes changes in immunosuppression, evaluation of proteinuria, rises in creatinine, management of hyperlipidemia, hypertension, follow-up for evaluating renal function, infectious complications, and other conditions specific for this time period.

Late Transplant Recipients (> 1 year)

The objective is to provide an educational experience in late transplant care that includes infectious complications, metabolic abnormalities, chronic allograft dysfunction, bone disease, infectious complications, malignancies and other conditions specific for this time period.

A multidisciplinary meeting of attendings from surgical and medical transplant team and nurse coordinators is held weekly to discuss all pre-transplant candidates who were seen during the week. Clinical factors are weighed that determine whether a patient will be a candidate for transplantation. Fellows are educated on this decision-making process.

Recommended Reading and References

1. Massry and Glassock: Textbook of Nephrology
2. Danovitch: Handbook of Kidney Transplantation

Measurement of Competencies

Throughout the rotation, attending physicians are responsible for evaluating competencies of all fellows. This process begins with the start of each rotation when attendings review the curriculum and competency measurements with fellows. Expectations and goals are set and discussed. At the mid-point and at end of the rotation, performance is reviewed along with a detailed written evaluation. Evaluations are reviewed by the program director.

Specific competencies that are assessed include:

PC	Provision of compassionate, effective care that promotes patient well-being
MK	Demonstration of effective application of biomedical, clinical and social skills and knowledge to the care of patients; also assessed through formal didactic teaching and examination
PBLI	Use of evidence and sound methodology to investigate, evaluate and improve patient care practices
ICS	Demonstration of these skills and effective functioning in maintaining professional and therapeutic relationships with patients and the healthcare team
PROF	Demonstration of behaviors that reflect ongoing commitment to continuous professional development, ethical practice, sensitivity to diversity and responsible attitudes
SBP	Demonstration of understanding of contexts and systems in which health care is provided and application of this knowledge in improving health care

D. Outpatient Clinical Continuity Clinic

General Description

1. Fellows spend one half-day per week in their continuity clinic. In this setting, fellows will:
 - evaluate new outpatient consultations
 - formulate diagnostic and treatment plans
 - coordinate care with the referring physician
 - have longitudinal care of patients with nephrological problems
2. Fellows are directly supervised by a faculty member and each patient encounter is used as a teaching opportunity. In general, fellows will see 2-3 new patients and 3-5 established patients per session. Fellows and attendings work closely to provide a strong teaching experience that emphasizes the core of outpatient Nephrology practice.

Goals and Objectives

Fellows are expected to learn the pathogenesis, complications, and management of:

- Disorders of fluid and electrolytes water sodium, potassium, calcium, magnesium, and phosphorus balance
- Acid-base balance and disorders
- Acute renal failure
- Chronic renal failure
- Nutritional aspects of renal failure
- Urinary tract infection
- Metabolic bone disease (osteitis fibrosa cystica, aluminum bone disease, osteomalacia, and beta-2 microglobulin)
- Nephrolithiasis causation and management
- Isolated hematuria
- Isolated non-nephrotic proteinuria
- Nephrotic and nephritic syndrome and the renal vascular diseases listed in the histopathology rotation goals and objectives
- Tubulointerstitial diseases (pyelonephritis, reflux nephropathy, acute and chronic interstitial nephritis, gouty nephropathy, polycystic kidney disease)
- Pregnancy-induced renal disease (preeclampsia, post partum renal failure and those renal diseases exacerbated by pregnancy)
- Drug metabolism and dosing in renal failure
- Essential, malignant, and secondary forms of hypertension

Measurement of Competencies

Throughout the rotation, attending physicians are responsible for evaluating competencies of all fellows. Because this is a two-year continuity experience with the same attending throughout the fellowship, biannual evaluations are provided. Evaluations are reviewed by the program director.

Specific competencies that are assessed include:

PC	Provision of compassionate, effective care that promotes patient well-being. Includes proficient history and physical examination skills, prompt follow-up of patient results, and compassionate and thorough education of patients about their disease state.
MK	Demonstration of effective application of biomedical, clinical and social skills and knowledge to the care of patients; also assessed through formal didactic teaching and examination. Core of medical knowledge is assessed and emphasized through each longitudinal patient encounter.

PBLI	Use of evidence and sound methodology to investigate, evaluate and improve patient care practices. Fellows are asked to critically evaluate their own performance, and once per year patients are selected to provide feedback on fellow performance in the clinic.
ICS	Demonstration of these skills and effective functioning in maintaining professional and therapeutic relationships with patients and the healthcare team. Expectation to learn the skills needed to effectively convey complex therapeutic decisions and difficult choices including end-of-life issues.
PROF	Demonstration of behaviors that reflect ongoing commitment to continuous professional development, ethical practice, sensitivity to diversity and responsible attitudes
SBP	Demonstration of understanding of contexts and systems in which health care is provided and application of this knowledge in improving health care. Fellows are exposed to financial operations of the clinic and proper billing procedures involved in practice.

E. Histopathology Rotation (Elective)

General Description

The fellow will have the opportunity to spend one month examining real biopsy specimens with renal pathology faculty (Dr. Helen Cathro). This will be in addition to monthly pathology conferences. The fellow will be responsible for examining biopsy specimens obtained during the month and will review other biopsy specimens that are in the teaching file.

Goals and Objectives

1. Become familiar with the preparation of renal biopsy specimens:
 - Type of solutions used for light (LM), immunofluorescence (IF), and electron microscopy (EM) specimens immediately post-biopsy
 - The basics of specimen preparation for LM, IF, and EM
2. Explain the uses and advantages of specific stains to include hematoxylin and eosin, periodic acid Schiff, Trichrome (Masson), silver-stains, elastin stain, congo red, methyl violet, thioflavine T, immunoperoxidase staining.
3. Recognize the histopathologic characteristics of normal kidney on LM, IF, and EM.
4. Recognize the histopathologic characteristics of the following disease states on LM, IF, and EM (using a combination of actual cases and teaching slides):
 - Minimal change disease
 - Focal glomerulosclerosis
 - Membranoproliferative GN
 - Membranous GN
 - World Health Organization classes of lupus nephritis
 - IgA nephropathy
 - Diabetic nephropathy
 - Amyloidosis
 - Myeloma kidney
 - Crescentic GN to include Wegener's granulomatosis, PAN, and idiopathic RPGN
 - Anti-GBM disease
 - Post-infections GN (especially PSGN and SBE)
 - Renal vasculitis
 - Scleroderma kidney
 - Hypertensive nephropathy/nephrosclerosis
 - Thrombotic microangiopathy
 - Interstitial nephritis, chronic and acute
 - Acute tubular necrosis
 - Transplant: acute cellular rejection, acute vascular rejection, cyclosporine toxicity, chronic rejection
5. Obtain adequate clinical background and information from the appropriate nephrologist submitting the specimen to allow optimal interpretation of the biopsy.
6. Upon completion of the rotation, a 45-60 minute presentation of cases and discussion that demonstrates the acquisition of the above knowledge. This can be done at Renal Grand Rounds where biopsy interpretation is part of a case presentation and discussion.

Recommended Reading and References

1. Renal Disease: Atlas of Glomerular Diseases by Jacob Churg
2. Tischer and Brenner: Renal Pathology
3. Those suggested by Dr. Cathro.

Evaluation

Because no direct patient care is performed during this rotation, clinical competencies are not assessed. However, fellows are expected to maintain a high standard of behavior and professionalism during the rotation.

F. Pediatric Nephrology Rotation (Elective)

General Description

During the second year of fellowship, nephrology fellows will have the *option* to rotate for one month in Pediatric Nephrology. The participant will function as a clinical Pediatric Nephrology fellow, assuming responsibility for the care of inpatients and outpatients under the direction of the Pediatric Nephrology attending staff.

Goals and Objectives

1. Attend and participate in Pediatric Nephrology conferences, Renal Grand Rounds, and Journal Club/Biopsy Conference with Adult Nephrology.
2. Become familiar with the pathogenesis, clinical presentation, differential diagnosis, management, and therapy of the following:
 - Acute renal failure in children
 - Hematuria, to include the following diseases: post-streptococcal GN, IgA nephropathy, sickle cell nephropathy, familial hematuric syndromes including Alport's Syndrome and benign familial hematuria, Henoch-Schönlein purpura, hypercalciuria, nephrotic syndrome, childhood and adolescent hypertension, vesicoureteral reflux, other disease states encountered during rotation
3. Understand the different problems and management of uremia in children with reference to:
Presentation of uremia
Mode of dialysis
Complications of uremia and dialysis
4. Understand the principles and management of children in reference to transplantation, including evaluation, immediate post-transplant care, and long-term follow-up.

Recommended Reading and References

1. Malcolm Holliday: Pediatric Nephrology (ed.)
2. Those suggested by the Pediatric Nephrology faculty

Measurement of Competencies

Throughout the rotation, attending physicians are responsible for evaluating competencies of all fellows. This process begins with the start of each rotation when attendings review the curriculum and competency measurements with fellows. Expectations and goals are set and discussed. Because this rotation mirrors other patient care rotations, our standard evaluation process occurs. At mid-point and at end of the rotation, performance is reviewed along with a detailed written evaluation. Evaluations are reviewed by the program director.

Specific competencies that are assessed include:

PC	Provision of compassionate, effective care that promotes patient well-being
MK	Demonstration of effective application of biomedical, clinical and social skills and knowledge to the care of patients; also assessed through formal didactic teaching and examination
PBLI	Use of evidence and sound methodology to investigate, evaluate and improve patient care practices
ICS	Demonstration of these skills and effective functioning in maintaining professional and therapeutic relationships with patients and the healthcare team
PROF	Demonstration of behaviors that reflect ongoing commitment to continuous professional development, ethical practice, sensitivity to diversity and responsible attitudes
SBP	Demonstration of understanding of contexts and systems in which health care is provided and application of this knowledge in improving health care

G. Curriculum/Clinic Experience in Peritoneal Dialysis

Purpose

1. To provide a comprehensive and longitudinal clinical experience in the care of patients on peritoneal dialysis.
2. To provide an understanding of the principles and practice of peritoneal dialysis including the indications, contraindications, complications, cost-effectiveness, and application of PD to patient care (see topics below).

General Description

1. Over the course of 2 years of fellowship, the following topics related to peritoneal dialysis will be covered by a combination of didactic and clinical experiences including case management conferences, lectures, journal club discussions, workshops, and direct patient care in the inpatient and outpatient settings. Clinical experiences will entail supervised involvement in decision-making for patients undergoing PD.
2. Opportunities also exist for fellows to pursue an in-depth investigation of specific topics through clinical research (ongoing and future) with the Director of the PD Program, Dr. Mitchell Rosner.
3. Curriculum Topics:
 - Peritoneal physiology, including the small solute clearance and ultrafiltration
 - The history of peritoneal dialysis
 - Evaluation and selection of patients for PD (CAPD, CCPD) and their instruction about treatment options
 - Assessing adequacy of PD and implications of adequacy related to patient morbidity and mortality, transporter status, peritoneal equilibration tests, residual renal function, KDOQI standards; dialysis prescriptions and their modifications to achieve adequate dialysis
 - The short and long-term complications of PD including the pathogenesis and prevention of complications including but not limited to: peritonitis, catheter infections, leaks, hernias, sclerosing peritonitis, nutritional and metabolic issues, hemoperitoneum
 - Placement and maintenance of peritoneal catheters and available catheters for use and how to choose appropriate catheters; the appropriate radiologic procedures for evaluating PD catheters
 - PD solutions: composition, biocompatibility, side effects
 - An understanding of the technology of PD including the use of automated cyclers (CCPD)
 - Principles of peritoneal biopsy
 - Pharmacology of commonly used medications and their kinetic and dosage alteration with PD; drug dosage modification during PD
 - Understanding of the special nutritional requirements of patients undergoing PD; urea kinetics and protein catabolic rates in PD patients; nutritional management of PD patients
 - Quality of life of patients on PD; psychosocial and ethical issues in PD patients and their families
 - Function of the nephrologist in the collaborative practice of PD including aspects of quality assurance and the function of a Medical Director in PD programs

Longitudinal Outpatient Clinical Experience

1. To provide each fellow with a longitudinal experience in the care and management of outpatients on PD, each fellow will follow at least 3-4 patients throughout the fellow's two-year training period. The fellow will see his or her patients in routine PD clinic visits at least every other month and will be directly supervised by the Medical Director of the PD program during these clinic visits. Fellows will thus be trained in the clinical topics listed above and will gain an appreciation for the evolving issues related to PD (e.g., loss of residual renal function and its effect on dialysis adequacy). Fellows will participate in the development of short- and long-term care plans for their patients. All outpatient

experiences will involve supervised decision-making for patients.

2. Patients with chronic kidney disease who are followed in Nephrology Clinic and choose PD when renal replacement therapy is required will continue to be followed by the same fellow when the patient is on PD.

Inpatient Clinical Experience

While rotating on the chronic inpatient service, fellows will prescribe PD for chronic PD patients who are hospitalized. The use of PD in the setting of acute renal failure will also be part of each fellow's training. Management of complications of PD (peritonitis, etc.) will be a focal point.

Teaching Aids & References

Fellows have access to the following references through the Health Sciences Library and the Medical Director's personal library:

1. Gokal R, Nolph KD, eds: Textbook of Peritoneal Dialysis
2. Khanna R, Nolph, KD, Oreopoulos DG: The Essentials of Peritoneal Dialysis
3. Daugirdas J, Ing T: Handbook of Dialysis, second edition
4. KDOQI Guidelines for PD
5. Peritoneal Dialysis International (bimonthly journal)

Measurement of Competencies

Throughout the rotation, attending physicians are responsible for evaluating competencies of all fellows. This process begins with the start of each rotation when attendings review the curriculum and competency measurements with fellows. Expectations and goals are set and discussed. Evaluations for this rotation/ experience are included with the biannual fellow reviews. Evaluations are reviewed by the program director.

Specific competencies that are assessed include:

PC	Provision of compassionate, effective care that promotes patient well-being
MK	Demonstration of effective application of biomedical, clinical and social skills and knowledge to the care of patients; also assessed through formal didactic teaching and examination
PBLI	Use of evidence and sound methodology to investigate, evaluate and improve patient care practices
ICS	Demonstration of these skills and effective functioning in maintaining professional and therapeutic relationships with patients and the healthcare team
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SBP	Demonstration of understanding of contexts and systems in which health care is provided and application of this knowledge in improving health care

H. Dialysis Rotation (Mandatory)

Purpose and General Description

The dialysis rotation will be a mandatory one month experience in which the *first-year* fellow will acquire the skills to effectively manage both hemodialysis and peritoneal dialysis patients.

Goals and Objectives

1. Evaluate end-stage renal disease patients for various forms of renal replacement therapy and their instruction regarding treatment options. One session where dialysis options are discussed with a patient will be observed to provide feedback.
2. Become familiar with drug dosage modification during dialysis and other extra-corporeal therapies.
3. Evaluate and manage medical complications in patients during and between dialyses and other extra-corporeal therapies, including dialysis access and an understanding of the pathogenesis and prevention of such complications.
4. Provide long-term follow-up of patients undergoing chronic dialysis, including their dialysis, prescription and modification and assessment of adequacy of dialysis.
5. Understand the principles and practice of peritoneal dialysis, including the establishment of peritoneal access, the principles of dialysis catheters, and how to choose appropriate catheters.
6. Understand the technology of peritoneal dialysis, including the use of automated cyclers.
7. Become familiar with assessment of peritoneal dialysis efficiency using peritoneal equilibration testing.
8. Understand how to write a peritoneal dialysis prescription and how to assess peritoneal dialysis adequacy (assessment & treatment of ultrafiltration failure).
9. Understand the pharmacology of commonly used medications and their kinetic and dosage alteration with peritoneal dialysis.
10. Understand the complications of peritoneal dialysis, including peritonitis and its treatment, exit site and tunnel infections and their management, hernias, plural effusions and other less common complications and their management.
11. Understand the special nutritional requirements of the hemodialysis and peritoneal dialysis patient.
12. Become familiar with the forms required by CMS upon patient initiation of dialysis (2728) and patient death (death notification forms).

Procedural Proficiency Skills

1. Access for dialysis: indications, contraindications, and complications related to peritoneal dialysis catheters, arteriovenous fistula placement, arteriovenous graft placement, and tunneled dialysis catheter placement
2. Declotting of catheters and fistulas
3. Revision of failing AV access
4. Use of ultrasound mapping of venous anatomy
5. Use of angiography to assess access
6. Access surveillance

Structure of Rotation

1. The rotation is divided into blocks:
 - One week is spent in the chronic dialysis unit functioning as a dialysis technician. The goal is to learn the skills to cannulate a dialysis access (grafts, fistulas and catheters), troubleshoot problems with the dialysis machines, and understand water treatment. The fellow will be expected to be present in the dialysis unit from the start of the first shift until the end of the second shift. Detailed learning materials will be provided.
 - Two sessions per week are in the surgical vascular access clinic with Drs. Brayman and Schenk. Fellows will participate in the evaluation of patients for new dialysis access and patients who are experiencing problems with the access.
2. Fellows will be expected to read one of several textbooks on dialysis.
Recommended: Nissensen and Fine, *Dialysis Therapy*; Daugirdas and Ing, *Handbook of Dialysis*.
3. Fellows will be expected to complete one small project during the month. This may be:
 - a. Quality improvement project that identifies an area in the dialysis unit that needs analysis of its performance and suggests ways for improvement.
 - b. Development of a research protocol that can be submitted for IRB approval on a research question that pertains to dialysis. This requires background investigation and design of a research protocol.
4. Fellows will be expected to attend one staff meeting (either HD or PD unit) to observe continuing quality improvement projects and to become familiar with some of the responsibilities of the dialysis unit Medical Director.
5. Give a 30 minute inservice educational session to the Kidney Center dialysis unit staff. The topic is at the discretion of the fellow, in consultation with Dr. Rosner and the dialysis unit managers. Potential topics include: Risks and Benefits of sodium modeling, How to assess "dry weight, Differences in iron preparation, Contraindications to kidney transplantation, How to best monitor an AV access.

Measurement of Competencies

Throughout the rotation, attending physicians are responsible for evaluating competencies of all fellows. This process begins with the start of each rotation when attendings review the curriculum and competency measurements with fellows. Expectations and goals are set and discussed. Evaluations for this rotation/ experience are included with the biannual fellow reviews. Evaluations are reviewed by the program director.

Specific competencies that are assessed include:

PC	Provision of compassionate, effective care that promotes patient well-being
MK	Demonstration of effective application of biomedical, clinical and social skills and knowledge to the care of patients; also assessed through formal didactic teaching and examination
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I. Research Experience

Director: Dr. Mark Okusa, Division of Nephrology

Goals and Objectives

1. To provide an opportunity to participate in basic science or clinical research and develop a critical understanding of the topic to be studied.
2. To develop skills in the design and execution of research project.
3. To develop skills in the analysis of the data.
4. To develop skills in presentation of a research project.

General Description

The fellow will choose a mentor whose research is of interest to the fellow. The fellow will discuss the project with the mentor and together construct a one-page description of the project that includes: (1) Background, (2) Hypothesis, (3) Methods to be used, and (4) Research budget. The project description will then be submitted to the Elective Directors who will evaluate the proposal. Mentors should be able to provide funds for the project from existing sources. For those proposals that are accepted, the applicant and mentor may submit a request to the Division for seed money to assist in initiation of the project. Such funds will depend on availability.

Expectations of Fellows

At the end of each research month, the fellow is expected to have written a progress report to the Elective Directors. At the end of the research elective, the fellow will be required to present his/her research to the Division and it is anticipated that the fellow will be able to write a manuscript describing the research.

Research In the Division of Nephrology

In 2005, a major restructuring of the research program in the Division of Nephrology was initiated with the goal to train academicians interested primarily in clinical or basic research investigation. The program consists of training fellows in investigative methods following the completion of their clinical training. In August 2006, the Division of Nephrology was awarded an NIH T32 entitled *Kidney Disease and Inflammation*. The goal of this NIH training program is to train the next generation of kidney researchers. This program is open to both MDs and PhDs. The infrastructure permits training of fellows during periods of time during their two years of clinical training. Rotations of greater than one month (preferably 2-3 months) will permit a deeper appreciation of investigative methods, statistical analysis, and study design.

Another major change to the research program began in July 2007 with the creation of a new Center for Immunity, Inflammation and Regenerative Medicine (CIIR). Dr. Mark Okusa is the Center Director. The center consists of members of the scientific community from Nephrology and other disciplines with an interest in immunology, stem cell biology, and kidney disease. Investigators are well funded by NIH grants and foundation grants.

Basic Science-Translational Research

Each preceptor has independent extramural funding that provides full support for personnel, equipment and modern laboratories for the research proposed. Conventional equipment is available in every laboratory and an array of outstanding university supported shared facilities exist. All laboratories are well equipped with state-of-the-art instrumentation to conduct experiments at various levels ranging from human studies to molecular approaches.

Clinical Investigation

The University of Virginia has a long-standing commitment to train clinical investigators in clinical research. The foundation for clinical investigation at UVA is the General Clinical Research Center (GCRC) which opened in April 1968. This is an NIH-supported, multi-disciplinary research facility located on the 8th Floor

of the University Hospital. The GCRC provides investigators with the specialized resources necessary to conduct advanced clinical research. The facility includes ten inpatient beds, skilled research nurses, a core assay laboratory, a metabolic kitchen, outpatient facilities, computing and statistical consultants and facilities, and sleep and exercise physiology laboratories. Over the years, the GCRC, currently under the direction of Dr. Eugene Barrett, has provided a supportive environment for clinical investigators of all persuasions to conduct clinical research studies in areas of their interest.

The Nephrology Clinical Research Center (NCRC) is a 2300 sq ft dedicated clinical research facility geographically adjacent to the Division of Nephrology operations. The NCRC is dedicated to the conduction of studies related to kidney diseases. All clinical trials and research in the Division are conducted through the NCRC. The unit, directed by Dr Kline Bolton with Associate Directors Drs. Norwood, Chief of Pediatrics, and Kalantarinia of the nephrology division, not only conducts clinical trials in pediatric and adult subjects, but also oversees the IRB and HIPAA regulatory activities within the Division. Current trials include NIH funded studies, phase I and II therapeutic and device trials, and investigator initiated studies. Coordinators are highly experienced and all are Certified Clinical Research Coordinators (CCRC).

The Department of Public Health Sciences, under the direction of Dr. William A. Knaus, provides pivotal expertise in clinical investigation. The result of this impetus is a formal Master of Science degree program housed within the Department that currently attracts 25 to 30 new students per year.

Educational Activities will consist of: (1) Formal courses offered by the School of Medicine as part of the Multidisciplinary Training Program in Clinical Investigation (MTPCI) and/or Health Evaluation Sciences, (2) Division of Nephrology Research in Progress and Renal Grand Rounds, which will enable the applicant to have exposure to clinically relevant questions that will foster translational research, (3) attendance at seminars, colloquia and meetings that relate to interest of trainees. The Cardiovascular Research Center (CVRC), Beirne Carter Center for Immunology, and Specialized Center for Research in SLE sponsor regular seminars that primarily focus on inflammation/immune system, and (4) development of communication and presentation skills.

The Multidisciplinary Training Program in Clinical Investigation (MTPCI) fosters, recruits, trains, and prepares outstanding physicians and allied scientists in human subject-oriented research designed to clarify the nature of homeostatic mechanisms operative in health and to elucidate pathophysiologic mechanisms that cause or sustain disease. This non-degree course embraces all modalities of hypothesis-based, scientifically valid, cutting-edge clinical research. In addition, the expectation of the training program is to provide clinical investigators with experience and expertise to conduct independent clinical investigations as a substantial component of their careers. The MTPCI targets post-doctoral fellows and junior faculty members (MDs and PhDs) who recognize the potential benefits of (1) a sound didactic experience and (2) a high quality mentoring system, but who for a variety of reasons may not wish to enter a graduate program. In an effort to maintain maximum flexibility, MTPCI trainees may choose to pursue a "Certificate of Clinical Investigation" that requires successful completion of four core curriculum courses plus electives, or to participate in a more limited didactic program auditing appropriate courses. All MTPCI Trainees are provided the same mentoring support. Currently, the core curriculum is comprised of Introduction to Clinical Investigation, Biostatistics, Fundamentals of Epidemiology and Research Ethics. Candidates must apply to the MTPCI program and, once accepted into the program, a Mentoring Committee is selected that includes two senior faculty members and one member from the MTPCI Advisory Committee.

The M.S. in Health Evaluation Sciences is an interdisciplinary 31-credit graduate degree designed to meet the changing needs of the current health care field, particularly the increasing need for trained professionals with well-developed quantitative and analytic skills. Concentrations are available in (1) *Clinical Investigation & Patient-Oriented Research* and (2) *Informatics in Medicine*. The trainee may pursue a written thesis or a practicum. This program is available should the fellow choose to pursue additional years of training.

The Masters of Public Health (MPH) is an interdisciplinary 42-credit professional degree designed to provide health care and other professionals with an understanding of the public health sciences, knowledge and skills that can be used in health care management, population-based research, and the community practice of public health. Graduates are generally prepared for roles in a variety of public and regulatory agencies, in for-profit and not-for-profit health agencies, and in health services research. Concentrations are available in (1) *Generalist: Practice & Research Track* and (2) *Health Policy, Law, and Ethics Track*. In addition to course work, each student must complete a practicum and a culminating experience. Practical knowledge and skills are considered an important component of a public health professional degree program; students must apply the knowledge and skills acquired through their courses of study. This program is available should the fellow chooses to pursue additional years of training.

Research ethics and the responsible conduct of research. Each trainee will be required to take a course devoted to research ethics and the responsible conduct of research, offered annually by the School of Medicine. The lecture series is a reading/discussion course presented by a team of faculty from a variety of departments within the Medical School.

Other: Additional institutional requirements that are necessary for trainees are available online through the university website and include Radiation Safety, Biohazards, Animal Welfare and Infection Control.

J. Urology Elective

General Description

1. Nephrology fellows will rotate with the Urology department for a one-month elective. The goal is to expose fellows to the broad array of urological problems. During the rotation, fellows will join the Urological inpatient team for morning rounds (usually beginning at 6:00 AM) on Mondays through Fridays (with the exception of any morning a fellow has Renal clinic). The fellow will become an active member of the inpatient service during morning rounds. After rounds, the fellow will have the option to attend clinics, the main operating room or the GU operating room in the clinic. It is hoped that this experience will expose the fellow to the common problems and procedures faced by the Urologist. It is also anticipated that the fellow will be available to aid with any patient care issues that may arise in the clinic or on the inpatient service.
2. The fellow will be expected to attend all conferences in the Department:
Monday: 5:00 - 6:00 Rotating conference topics
Wednesday: 7:45 AM Urological topics
Wednesday: 9:00 AM Tumor board (every other Wed)
3. At the end of the rotation, the fellow will be expected to make a short presentation to the Urology department on a topic of mutual interest.

Goals and Objectives

Fellows are expected to learn:

1. Evaluation and treatment of patients with renal and uroepithelial tumors
2. Basic surgical anatomy of the kidney, ureters and bladder
3. Evaluation and treatment of prostate cancer and benign prostatic hypertrophy
4. Evaluation, medical and surgical management of Nephrolithiasis
5. Basics of urological imaging techniques, lithotripsy, cystoscopy and urodynamics
8. Evaluation and management of voiding dysfunction/incontinence
9. Evaluation and management of sexual dysfunction

Measurement of Competencies

Throughout the rotation, attending physicians are responsible for evaluating competencies of all fellows. This process begins with the start of each rotation when attendings review the curriculum and competency measurements with fellows. Expectations and goals are set and discussed. Evaluations for this rotation/ experience are included with the biannual fellow reviews. Evaluations are reviewed by the program director.

Specific competencies that are assessed include:

PC	Provision of compassionate, effective care that promotes patient well-being
MK	Demonstration of effective application of biomedical, clinical and social skills and knowledge to the care of patients; also assessed through formal didactic teaching and examination
PBLI	Use of evidence and sound methodology to investigate, evaluate and improve patient care practices
ICS	Demonstration of these skills and effective functioning in maintaining professional and therapeutic relationships with patients and the healthcare team
PROF	Demonstration of behaviors that reflect ongoing commitment to continuous professional development, ethical practice, sensitivity to diversity and responsible attitudes
SBP	Demonstration of understanding of contexts and systems in which health care is provided and application of this knowledge in improving health care